

Chapter 23A

Wood

Comparison Summary

OSHPD has focused their review on the Allowable Stress Design (ASD) provisions of the model code, since this is the most common method used. The 2001 CBC uses only the NDS and its Supplement (2 documents), in conjunction with the provisions of CBC Chapter 23A.

IBC 2003

Chapter 23 of the *IBC*, covering wood construction, is 69 pages long. Compared to the 2001 *CBC*, the chapter is better organized, more concise, and very usable. *IBC* Chapter 23 contains requirements for both engineered and conventional construction. While there are several referenced standards referred to in Section 2306 that are not written in strictly enforceable language, they cover seldom-used topics such as plywood curved panels and stressed-skin systems. OSHPD does not believe these references pose a significant problem.

IBC contains provisions for conventional construction that are applicable to wood-frame structures regardless of occupancy.

NFPA 5000

In contrast, the wood design chapter in *NFPA 5000* (Chapter 45) is unenforceable as written. Chapter 45 contains durability provisions, and references to material and design standards, covering 8 pages. *NFPA 5000* adopts the American Forest Products and Paper Association (AF&PA) *Allowable Stress Design (ASD) Manual for Engineered Wood Construction*. The ASD Manual is a multi-part package, and includes 6 separate documents:

- 2001 *NDS and Supplement* (design values)
- *Supplements* (lumber, glue-lam, poles, panels, diaphragms & shear walls)
- *Supplement: Special Design Provisions for Wind and Seismic*
- Two *Guidelines* (I-joists, composites, trusses, metal connectors)

No order of precedence is established among the various volumes. The manual contains fire-safety design provisions that will require a coordinated review with the SFM for adoption.

The *AF&PA ASD Manual*, *Supplements*, and *Guidelines* comprise a guide for design professionals (as stated in the Preface of the Manual) and is not formatted or written as an enforceable standard. The manual volume itself consists of 98 pages. Fully one-fifth of the manual volume consists of "Project Profiles: Case Studies", that have no place in a building code. Another 17 pages are occupied by design examples. A further 20 pages provide "General Information", including shear and moment diagrams for beams that are available in any general structural engineering reference book. The remaining text, while useful as a design guide, is unenforceable. A sample provision for cross-grain tension from Section 3.1 illustrates the style and presentation of the manual:

The designer is advised that use of wood members in applications that induce tension perpendicular to grain stresses should be avoided.

There are additional difficulties with the use of the *AF&PA ASD Manual* as an enforceable document. There are two different sets of requirements for the design of shear walls and diaphragms, one set contained in the *Supplement* and another in the “*2001 Editions Supplement, Special Design Provisions for Wind and Seismic*”. There are inconsistencies between the design values in these two documents, and no indication of the extent to which one document takes precedence over the other.

The supplement *Special Design Provisions for Wind and Seismic* is written in enforceable standard format and contains provisions that would, with amendment, be incorporated in the 2004 CBC.

NFPA 5000 does not contain provisions for conventional construction, and references the “*Wood Frame Construction Manual for One- and Two-Family Dwellings*” (WFCM) for one- and two-family dwelling design and construction (the WFCM also contains prescriptive design provisions in both Part 2 and Part 3, with duplication). Additionally, the WFCM is based on *ASCE 7-98*, while *NFPA 5000* references *ASCE 7-02*. The WFCM is strictly limited in applicability to one- and two-family dwelling design, and therefore cannot be extended to cover other occupancies. The lack of conventional construction provisions in *NFPA 5000* is a serious deficiency, since they cover fundamental aspects of wood construction, such as vertical offsets, notching and boring of wood members, exterior wall and partition detailing, and a host of other topics.

Summary

Chapter 23 of the *IBC*, covering wood construction, is a comprehensive presentation of wood design, and superior to the wood chapter in the 2001 *CBC*.

The *ASD* manual referenced in *NFPA 5000* is an excellent resource for designers. However, it is not an enforceable code document. It is more in the form of a textbook and guide than a building code. There are other referenced publications in the wood chapter that do not appear to be enforceable, such as the *AF&PA Load and Resistance Factor Design (LRFD) Manual for Engineered Wood Construction* and the Southern Pine Council *Wood Foundations Design & Construction Guide*. If *NFPA 5000* is adopted a new wood Chapter, incorporating references to the *NDS* and *NDS Supplement* (which are enforceable standards) will need to be prepared. This is a very significant effort, since the existing wood provisions in the *CBC* and *IBC* are copyrighted, and cannot be transcribed.

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
Division I - General Design Requirements 2301A – General A.1 Scope A.2 Design methods - refers to 1612A.3, 2305A for ASD and conventional light-frame const.	2301 General 2301.1 Scope. 2301.2 General design requirements. 2.1 ASD - 2306 2.2 LRFD - 2307 2.3 conventional provisions - 2308	Similar
2202A - Definitions	2302 Definitions	Similar Evaluate OSHPD amendment re: definition of "wood structural panel"; may adopt model code definition if justified (e.g. shear wall test data for OSB)
2203A - Standards of Quality 1. Grading rules 2. Glue-laminated timber 3. Preservative treatment 4. Product standards 5. Design standards 6. Fire retardancy 7. Adhesives and glues 8. Design values	2303 Minimum Standards and Quality 2303.1 General. 1.1 Lumber 1.2 I-joists (new) 1.3 glu-lam 1.4 wood structural panels 1.5 fiberboard 1.6 hardboard 1.7 particleboard 1.8 preservative-treated wood 1.9 structural composite lumber 3.2 Fire-retardant-treated wood 3.3 Hardwood plywood 3.4 Trusses 3.5 Test standard for joist hangers 3.6 Nails/staples (ASTM F 1667)	IBC 2303 combines CBC Sec. 2303 and 2304 IBC contains additional provisions re: fire-retardant lumber IBC contains additional provisions for trusses (2303.4.1 truss design drawings) Evaluate 2303.1.4 Wood structural panels (see 2302) Evaluate 2303.1.5 Fiberboard for adoption Evaluate 2303.1.6 Hardboard for adoption Evaluate 2303.1.7 Particleboard provision re: 2306.4.3 IBC contains updated provisions to current standards and materials.
2304A - Minimum Quality A.1 Quality and identification A.2 Minimum capacity or grade (OSHPD amends - no end-jointed lumber unless approved) A.3 Timber connectors A.4 Fabrication, installation, manufacture 4.1 General 4.2 Connectors - refers to Div. III 4.3 Glue-lams -supervision of fabrication 4.4 Metal-plate trusses - refers to Div. V, approved agency insp. 4.5 Fire-retardant treated wood at max. 19% m.c., ply at 15%. 4.6 Size of members - net size 4.7 Shrinkage consideration 4.8 OSHPD amendment re: rejection and application of UBC Std. 23-1.	2303 Minimum Standards and Quality 2303.1 General. 1.1 Lumber 1.2 I-joists (new) 1.3 glu-lam 1.4 wood structural panels 1.5 fiberboard 1.6 hardboard 1.7 particleboard 1.8 preservative-treated wood 1.9 structural composite lumber 3.2 Fire-retardant-treated wood 3.3 Hardwood plywood 3.4 Trusses 3.5 Test standard for joist hangers 3.6 Nails/staples (ASTM F 1667) Note: 2304A.3 (re: HD galv. nails in PT or FR material) addressed by IBC 2304.9.5 (same provision)	IBC 2303 combines CBC Sec. 2303 and 2304 New provisions re: fire-retardant lumber Evaluate CBC 2304A.8 amendment for continuation - appears to be dated, may discontinue; regardless, it imposes responsibility on inspector that can not be fulfilled (inspectors are generally not qualified lumber graders)

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
2305A - Design and Construction Requirements A.1 General	2301.2 General design requirements.	Similar
A.2 Requires compliance with Div. I, and Div. II, Part I.	2301.2.1 (ASD - 2306) 2301.2.2 (LRFD - 2307 ref. std.)	Similar
A.3 Wind/EQ systems for engineered bldg. Per Div. II, Part II	2301.2.1 (ASD) refers to 2305 2301.2.2 (LRFD) refers to 2305	Evaluate adoption of LRFD; note that CBC does not adopt LRFD (2303A, item 5.4 not adopted)
A.4 ASD design/const. Per Div. III	2306	Similar
A.5 Design/const. of conventional light-frame const. per Div. IV.	2301.2.3	Similar
A.6 Connectors per Div. III, Part III	-	No effect
A.7 Metal plate trusses per Div. V	-	No effect
A.8 Glued built-up members with plywood per Div. VI	-	No effect
A.9 Not adopted by OSHPD	-	No effect
A.10 Not adopted by OSHPD	-	No effect
A.11 OSHPD amendment - testing & inspection per Div. IX	-	No effect
Division II - General Requirements Part I - Requirements Applicable to All Design Methods (2316-2314) 2306A - Decay and Termite Protection	2304 General Construction Requirements	IBC formatting different, appears to be generally more cohesive. Note – IBC intermingles tables with code text, which is convenient when the table is small, and inconvenient when the table is large (text is disrupted by 1-3 pages of tables).
A.1 Preparation of Bldg Site Reference to Sec. 3302	-	IBC 3304.1
A.2 Wood Support Embedded in Ground PT requirement- ground contact	2304.11.4 Wood in contact with ground or fresh water.	Similar
A.3 Under-floor Clearance 18"/12" clearance and access	2304.11.2.1 Joists, girders and subfloor.	Similar, except provision for access (18" x 24" opening) found in IBC Sec. 1209 (access to unoccupied areas).
A.4 Plates, Sills and Sleepers treated with approved agency stamp (OSHPD amendment - 12" above grade or 6" w/ mow strip; curb at toilet room)	2304.2.3 Sleepers and sills.	IBC does not address sills on masonry/concrete foundation walls – evaluate for amendment to continue 2001 CBC language Continue OSHPD amendment
A.5 Columns and Posts 8" above exposed ground; OSHPD amends - exposed columns	2304.11.2.6 Posts or columns.	Similar Evaluate OSHPD amendment for continuation
A.6 Girders Entering Masonry or Concrete Walls 1/2" clearance at end/side of girder OSHPD amends to include joists & beams, field treatment	2304.11.2.4 Girder ends.	Similar Continue OSHPD amendment

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
A.7 Under-floor Ventilation 1/150 floor area cross venting, screening	2304.11.9 Under-floor ventilation refers to 1203.3	Similar
A.8 Wood and Earth Separation 6" clearance unless PT, planters to have 2" air space	2304.11.2.2 Framing. 2304.11.2.5 Wood siding.	Similar
A.9 Wood Supporting Roofs and Floors Decay resistant or PT if exposed	2304.11.4.2 Wood structural members.	Similar
A.10 Moisture Content of Treated Wood Max. 19% m.c. prior to closing in	2303.1.8.2 Moisture content.	Similar IBC provision is in more appropriate Section.
A.11 - not adopted by OSHPD	-	
A.12 Weather Exposure Exposed glue-laminated timber to be PT or decay resistant; plywood also (OSHPD amends)	2304.11.3 Laminated timbers 2304.11.5 Wood structural members	2304.11.5 - IBC has better charging language
A.13 Water Splash WP paper protection if exposed to water splash (tile, plaster)	-	Evaluate need for OSHPD amendment to continue CBC provision
2307A - Wood Supporting Masonry or Concrete Prohibits use of wood to support masonry/concrete DL, with 4 exceptions noted	2304.12 Wood supporting masonry or concrete.	Similar
2308A - Wall Framing Wall framing per Div. IV unless specific design provided/approved Shrinkage analysis if > 2 stories + roof	2304.3 Wall framing. 2304.3.3 Shrinkage.	Similar – requires walls to be framed per conventional provisions unless specific design provided Shrinkage provisions similar
2309A - Floor Framing Reference to Ch. 16A for wall-floor anchorage Reference to Sec. 708 fire blocking and draft stopping	2304.4 Floor and roof framing.	IBC – no ref. to Ch 16A and no ref. to fire block and draft stop provisions (IBC 717) Non-issue
2310A - Exterior Wall Covering		General comment – IBC does not appear to contain prescriptive provisions (and in one location) that previous UBC provided for wood wall coverings.
A.1 General Weather-resistive barrier	1403.2 Weather protection 2304.6 Wall sheathing.	Similar (IBC does not contain reference to applicable Ch 14 provisions)
A.2 Siding Siding materials, fastening	2304.6 Wall sheathing. Table 2304.6	IBC has differences – no provision for fastening, no beveled siding dimensional provisions, no provision for blocking support at vertical siding
A.3 Plywood Exterior application and joint treatment requirements	2304.6.1 Wood structural panel sheathing.	IBC does not contain provision for joint treatment

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
A.4 Shingles or Shakes Bldg. Paper, fasteners, weather exposure per Table 23A-II-K	1403.2, 1405.2 Table 1405.2	IBC does not contain provisions for support (stripping), corrosion-resistant fasteners, weather exposure
A.5 Particleboard Exterior application and fastening, joint treatment	2304.6 Table 2304.6	IBC discontinues acceptance of type M-1 particleboard, no provisions for gapping, joint treatment, nail edge distance
A.6 Hardboard Exterior application and fastening, joint treatment	2304.6, 1404.3 (refers to AHA A135.4, 135.6) 1405.2, Table 1405.2	IBC does not contain provisions for edge gap and edge treatment, nailing, lap siding provisions (may be contained in AHA Std. referenced in 1404.3)
A.7 Nailing (corrosion resistant)	Table 2304.9.1 Fastening Schedule (footnote f)	Could not find explicit provision in IBC; only footnote to Table 2304.9.1 as noted. Consider OSHPD amendment to continue CBC A.7
2311A - Interior Paneling softwood structural panels - ref. to Table 23A-II-B-1, UBC Std. 23-3, Chapter 8 (int. finish)	2304.6.2 Interior paneling.	IBC references AHA Std., DOC PS 1 and PS 2. Appears more current than CBC.
2312A - Sheathing A.1 Structural floor sheathing - strength/stiffness (ref. to span table) A.2 Structural roof sheathing - strength/stiffness (ref. to span table)	2304.7.1 Structural floor sheathing. 2304.7.2 Structural roof sheathing.	Similar (IBC does not contain CBC provision for 300# conc. Load)
2313A - Mechanically Laminated Floors and Decks Prescriptive requirements for lumber set on edge	2304.8 Mechanically laminated floors and decks.	Same
2314A - Post-Beam Connections positive connection required	2304.9.7 Framing requirements.	Similar
Part II - Requirements Applicable to Engineered Design of Wind and EQ Load-Resisting Systems 2315A - Wood Shear Walls and Diaphragms	2305 General Design Requirements for Lateral-Force Resisting Systems	IBC 2305 is formatted differently from CBC 2315A, with separated (horizontal) diaphragm provisions from shear wall provisions. 2305.1 contains general provisions, 2305.2 contains diaphragm provisions, and 2305.3 contains shear wall provisions.
A.1 General Deflection consideration, ref. to UBC Std. 23-2 for deflection calc. Aspect ratio ref. to Table 16A-V OSHPD amendment re: test confirmation for analysis method Open-front bldg. limitations	2305.1 General. 2305.2 Design of wood diaphragms. 2305.3 Design of wood shear walls. 2305.3.5 contains open front building provisions	Similar; IBC contains deflection calculation formulas the CBC has in UBC Std. 23-2. Continue OSHPD amendment re: test confirmation
A.2 Wood Members Resisting Horizontal Forces Contributed by Masonry and Concrete OSHPD amendment - wood not allowed to resist continuously applied horizontal force	2305.1.5 Wood members resisting horizontal seismic forces contributed by masonry and concrete.	Evaluate continuation of OSHPD amendment limiting application to one-story buildings, and ½ allowable loads.

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
A.3 Wood Diaphragms 1. conventional lumber diaph. 2. special lumber diaph. 3. plywood diaph. (OSHDP amend)	2306.3.4 Single diagonally sheathed lumber diaphragms 2306.3.5 Double diag. sheathed lumber diaphragms 2306.4 Shear walls. 2305.2.4 Construction (horizontal diaph. w/ wood structural panels)	2306.3.4 and 3.5 are contained in ASD design provisions in IBC. OSHPD amendments to 2315A.3.3 are extensive, and need evaluation for continuation (some of the amendment provisions may not need continuation)
A.4 Particleboard Diaphragms. OSHPD amends - specific approval required for use	2306.4.3 Particleboard shear walls.	Evaluate for non-adoption
A.5 Wood Shear Walls and Diaphragms in Seismic Zones 3/4 1. scope 2. framing - OSHPD amends re: chord/collector location within 14" 3. wood structural panels - 24" min. width, blocking 4. heavy wood panels - 2x diag. Sheathing; panels overlaying straight sheathed deck 5. not adopted by OSHPD	2305.1.2 Framing. - addresses chords, collector members 2305.2.4 Construction. – addresses wood structural panels	Continue OSHPD amendment Evaluate 2305.3.7 (shear walls with openings) for adoption. May review APA diaphragm test data (as available).
A.6 Not adopted by OSHPD	-	
Table 23A-II-A-1 Exposed Plywood Panel Siding	Table 2304.6 Minimum Thickness of Wall Sheathing	IBC table addresses various types of sheathing No OSHPD amendment
Table 23A-II-A-2 Allowable Spans for Exposed Particleboard Panel Siding	Table 2304.6 Minimum Thickness of Wall Sheathing	IBC table addresses various types of sheathing No OSHPD amendment
Table 23A-II-B-1 Nailing Schedule (OSHDP amends)	Table 2304.9.1 Fastening Schedule	IBC Table incorporates staple option; continue OSHPD amendments and repeal staple option
Table 23A-II-B-2 Wood Structural Panel Roof Sheathing Nailing Schedule (wind)	-	No effect to OSHPD programs
Table 23A-II-C Hardboard Siding	Table 2308.9.3(6) Hardboard Siding	Similar (IBC Table prescribes fastener size, material requirements)
Table 23A-II-D-1 Allowable Spans for Lumber Floor and Roof Sheathing	Table 2304.7(1) Allowable Spans for Lumber Floor and Roof Sheathing	Same
Table 23A-II-D-2 Sheathing Lumber Minimum Grade Requirements: Board Grade	Table 2304.7(2) Sheathing Lumber Minimum Grade Requirements: Board Grade	Same
Table 23A-II-E-1 Allowable Spans and Loads for Wood Structural Panel Sheathing (perpendicular to supports)	Table 2304.7(3) Allowable Spans and Loads for Wood Structural Panel Sheathing (perpendicular to supports)	Same
Table 23A-II-E-2 Allowable Load for Wood	Table 2304.7(5) Allowable Load for Wood	Same

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
Structural Panel Roof Sheathing (parallel to supports)	Structural Panel Roof Sheathing (parallel to supports)	
Table 23A-II-F-1 Allowable Span for Wood Structural Panel Combination Subfloor-Underlayment	Table 2304.7(4) Allowable Span for Wood Structural Panel Combination Subfloor-Underlayment	Same
Table 23A-II-F-2 Not adopted by OSHPD	-	No effect to OSHPD programs
Table 23A-II-G Not adopted by OSHPD (OSHPD adopts Table 16A-V, which prescribes diaphragm aspect ratio limits)	Table 2305.2.3 Maximum Diaphragm Dimension Ratios – Horizontal and Sloped Diaphragm Table 2305.3.3 Maximum Shear Wall Aspect Ratio	Evaluate amendment of IBC tables per CBC Table 16A-V
-	Table 2305.3.7.2 Shear Resistance Adjustment Factor C_o	Evaluate for adoption (see IBC Sec. 2305.7 comments)
Table 23A-II-H Allowable Shear for Horizontal Diaphragms (OSHPD amends)	Table 2306.3.1 Recommended Shear (PLF) for Wood Structural Panel Diaphragms	Similar IBC table includes staple fasteners, is updated to DOC PS 1, PS 2 Evaluate continuation of OSHPD amendments
-	Table 2306.3.2 Allowable Shear (PLF) for Horizontal Blocked Diaphragms Utilizing Multiple Rows of Fasteners (High Load Diaphragm)	Evaluate for adoption (study test data); this table would be a new provision
-	2306.3.3 Diagonally Sheathed Lumber Diaphragm Nailing Schedule	IBC puts CBC requirements (Sec. 2315A.3.1) in Table format – can adopt
Table 23A-II-I-1 Allowable Shear for Plywood Shear Walls (OSHPD amends)	Table 2306.4.1 Allowable Shear (PLF) for Wood Structural Panel Shear Walls	Similar IBC table includes staple fasteners, is updated to DOC PS 1, PS 2 Evaluate continuation of OSHPD amendments
Table 23A-II-I-2 Not adopted by OSHPD	Table 2306.4.3 Allowable Shear for Particleboard Shear Wall Sheathing	OSHPD can only adopt (particleboard shear walls) upon review and acceptance of approved cyclic test data Do not adopt for 2004 CBC
Table 23A-II-J Not adopted by OSHPD	Table 2308.9.3(4) Allowable Shear Values for Wind or Seismic Loading on Vertical Diaphragms of Fiberboard Sheathing Board Construction for type V Construction Only	OSHPD can only adopt (fiberboard shear walls) upon review and acceptance of approved cyclic test data Do not adopt for 2004 CBC
Table 25A-I Not adopted by OSHPD	Table 2306.4.5 Allowable Shear for Wind or Seismic Forces for Shear Walls of Lath and Plaster or Gypsum Board Wood Framed Wall Assemblies	OSHPD can only adopt (plaster or gypsum board shear walls) upon review and acceptance of approved cyclic test data Do not adopt for 2004 CBC

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
Table 23A-II-K Wood Shingle and Shake Side Wall Exposures	-	Do not address (via amendment) this omission in 2003 model code
-	Figure 2305.2.5(1) Diaphragm Length and Width for Plan View of Open Front Building	Clarifies 2001 CBC Sec. 2315A.1 and IBC 2305.2.5 Adopt, study continuation of amendment to 2315A.1
-	Figure 2305.2.5(2) Diaphragm Length and Width for Plan View of Cantilevered Diaphragm	Clarifies 2001 CBC Sec. 2315A.1 and IBC 2305.2.5 Adopt, study continuation of amendment to 2315A.1
Figure 23A-II-1 General Definition of Shear Wall Height to Width Ratio	Figure 2305.3.4 General Definition of Shear Wall Height, Width and Height-to-Width Ratio	Same
Division III - Design Specification for Allowable Stress Design of Wood Buildings Part I - Allowable Stress Design of Wood References ANSI/NfoPA NDS-91 Revised 1991 Edition, and Supplement to the 1991 Edition	2306 Allowable Stress Design	IBC references 2001 edition NDS (contains updated standards and new standards for wood structural panels, structural composite lumber, I-joists) Evaluation of new NDS provisions required prior to adoption. IBC does not amend the 2001 ed. NDS (1997 UBC did amend 1991 rev. NDS, and OSHPD further amended)
2316A - Design Specifications A.1 Adoption and Scope Adopts NDS Rev. 1991 Ed., including Appendix F, G, J. Adopts Supplement - Tables 2A, 4A, 4B, 4C, 4D, 4E, 5A, 5B, 5C. OSHPD amends to delete C _r factor (rep stress inc.) from Tables	2306.1 Allowable Stress Design.	IBC 2306.1 references NDS (2001 ed., per chapter 35), and various AITC standards, TPI standard, ASAE standards, and APA design specifications
A.2 Amendments to NDS (model code amends per items 1 - 26; OSHPD further amends per items 1-35)	-	IBC does not amend the NDS; OSHPD will need to evaluate continuation of model code and OSHPD amendments, as 2001 NDS continues many 1991 NDS provisions that were amended in the 2001 CBC (see below).
OSHPD amendments item No: 1. scope amended (enforcement) 3. rep. stress inc. limitation 6. 25% DOL okay if 1 reroof inc. 8. 90% for fasteners if fire retard. 12. notches in sawn lumber 13. notches in glue-laminated 21. provisions for lateral support 22. bridging for roof/floor joists 23. radial tension reinforcement 25. radial tension design 28. glue lam manufacture, m.c. 29. glue lam specs, PT protection 30. bolt at wood to concrete 31. delete 12.2.3 - NDS provision 32. delete 12.3.7 - NDS provision	-	CBC amendments appear useful for enforcement agency use, need to evaluation for continuation: - reduces duplicity - repeals NDS references to non-codified references for design - deletes Appendix B Table for DOL (use tabulated values only, which are amended) - coordinates DOL with Chapter 16 load comb. requirements - glulam beam radial tension design requirements amended - fastener (nail) spacing prescriptive requirements - bolt at concrete allowed to be .5 dbl. shear value for wood member 2x thickness

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
2303A. item 5.4 (OSHDP does not adopt)	2307 Load and Resistance Factor Design Adopts ASCE 16 (1995 ed.)	Evaluate the necessity for OSHPD to review ASCE 16 for adoption. Check with industry, ICC, SEAOC ?? Check whether LRFD provisions address ASD provisions contained in 2306 re: construction requirements
Part II - Plywood Structural Panels 2317A - Plywood Structural Panels references Table 23A-III-A	-	IBC references DOC PS 1, and does not contain Table 23A-III-A. No amendment needed.
Part III - Fastenings 2318A - Timber Connectors and Fasteners A.1 General. References Div. III Part I (NDS), or 2318A.	23016.1 - Reference to NDS, see Section 10 and 11	All IBC connection provisions are contained only within the NDS, 2001 ed. There are fastener tables for various configurations (i.e. sideplates, member type/thickness) Also note new provision in NDS for rivets (Section 13). Current OSHPD amendments would need to be continued as amendments to the referenced standard. Staff training for use of NDS will be required.
A.2 Bolts Ref. Tables 23A-III-B-1, B-2. OSHDP amendment re: carriage bolts and cross grain shrinkage	23016.1 - Reference to NDS, see Sections 10 and 11	Evaluate OSHPD amendments for continuation (would be amending the NDS)
A.3 Nails and Spikes 1. allowable loads - ref. Tables 23A-III-C-1 and C2. OSHPD amendment - casing nails/toenails Zone 3/4 limitation - toenail 150 plf 2. Withdrawal values per Table 23A-III-D (OSHDP amends - limits to connection with 4 nails max) 3. spacing and penetration (OSHDP amends - 2 - 2x members nailed and overdriven plywd. Nails) 4. OSHPD amendment - corrosion resistance for exterior siding nails	23016.1 - Reference to NDS, see Sections 10 and 11 Nail withdrawal – see NDS Table 11.2c	Evaluate OSHPD amendments for continuation (amending the NDS) Revise exterior siding nail amendment from 1.5 oz. to 1.0 oz. coating requirement, may place exterior siding corrosion-resistant fastener amendment in 2304.9
A.4 Joist Hangers and Framing Anchors	2304.9.3 Joist Hangers and Framing Anchors.	Similar
A.5 Miscellaneous Fasteners 1. drift bolts/pins 2. spike grids	NDS provisions do not specifically address	No effect, since CBC provisions are general
A.6 (OSHDP amendment) Wood screws and lag screws 1. limitations on withdrawal; washer under head of lag screw	-	Evaluate amendments for continuation (would amend the NDS, Section 11)
A.7 (OSHDP amendment) Metal plate connectors for trusses 1. joint design 2. basic load values 3. inspection 4. truss loads 5. truss drawings 6. moisture content	2303.4 Trusses 2306.1 (refers to TPI 1, 2002 ed)	Evaluate amendments for continuation in TPI 1. Some amendment provisions may be addressed in the 2002 ed. TPI 1.

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
Part IV - Allowable Stress Design for Wind and EQ Loads 2319A - Wood Shear Walls and Diaphragms A.1 conventional lumber diaphragms (OSHPD amends to address allowable loads and 2x6 diagonal sheathing w/ 16d nails) A.2 special lumber diaphragms - ref. 2315A.3.2 A.3 plywood diaphragms - ref. to Tables and 2315A.3.3; addresses plywood on both sides of wall	2306.3 Wood diaphragms. 2306.3.2 Wood structural panel diaphragms 2306.3.4 Single diagonally sheathed lumber diaphragms 2306.3.5 Double diagonally sheathed lumber diaphragms 2306.3.6 Gypsum board diaphragm ceilings 2306.4 Shear walls 2305.3.8 Summing shear capacities.	Do not adopt 2306.3.6 Gypsum board ceiling diaphragms
A.4 & A.5 - Not adopted by OSHPD (particleboard and fiberboard sheathing diaphragms)	2306.4.3 Particleboard shear walls 2306.4.4 Fiberboard shear walls	OSHPD can not adopt unless cyclic test data provided, reviewed and accepted.
2513A not adopted by OSHPD	2306.4.5 Shear walls sheathed with other materials (gyp. bd., plaster)	OSHPD can not adopt unless cyclic test data provided, reviewed and accepted.
Table 23A-III-A Allowable Unit Stresses for Construction and Industrial Softwood Plywood	-	IBC references DOC PS 1, and does not contain Table 23A-III-A. No amendment needed.
Table 23A-III-B-1 Bolt Design Values for Single Shear Connections	NDS Table 11A, 11B, 11C, 11D, 11E Bolts: Design Values for Single Shear Connections	Similar
Table 23A-III-B-2 Bolt Design Values for Double Shear Connections	NDS Table 11F, 11G, 11H, 11I Bolts: Design Values for Double Shear Connections	Similar
Table 23A-III-C-1 Box Nail Design Values for Single Shear Connections	NDS Table 11N, 11P, 11Q, 11R Common Wire, Box, Sinker Nails: Design Values for Single Shear	Similar
Table 23A-III-C-2 Common Wire Nail Design Values for Single Shear Connections	NDS Table 11N, 11P, 11Q, 11R Common Wire, Box, Sinker Nails: Design Values for Single Shear	Similar
Table 23A-III-D Nail and Spike Withdrawal Design Values	NDS Table 11.2c Nail and Spike Withdrawal Design Values	Similar
Division IV – Conventional Light-Frame Construction 2320A - Conventional Light-Frame Construction Design Provisions A.1 General. (OSHPD amends to denote that conventional provisions are in addition to other requirements of code)	2308 Conventional Light-Frame Construction 2308.1 General	Continue OSHPD amendments to the general provisions.

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2001 CBC – Chapter 23A	IBC – Chapter 23	Comments
A.2 - A.5.5 not adopted by OSHPD	2308.2 Limitations 2308.3 Braced wall lines 2308.4 Design of portions	Do not adopt 2308.2, 2308.3, 2308.4
A5.6 Interior Brace Wall Support. foundation requirements	2308.3.4 Braced wall line support	Do not adopt
A.6 Foundation Plates or Sills. OSHPD amends - sill bolt size, spacing, end distance; AB embed sill plate notches; field treatment	2308.6 Foundation plates or sills.	Similar Continue OSHPD amendments. Consider new amendment to address modular construction (no concrete curb)
A.7 Girders.	2308.7 Girders	Similar
A.8 Floor Joists. 1. general (OSHPD amend - design per general provisions, calcs) 2. bearing 3. framing details; notches (OSHPD amend re: ledger strip 2x min) 4. framing around openings 5. supporting bearing walls (OSHPD amend re: built-up beams or blkg) 6. blocking 7. bridging (OSHPD amend)	2308.8 Floor joists 1. bearing 2. framing details 3. framing around openings 4. supporting bearing partitions 5. lateral support 6. structural floor sheathing 7. underfloor ventilation (refers to 1203.3)	Similar Continue OSHPD amendments
A.9 Subflooring. 1. not adopted by OSHPD 2. plywood - ref. tables 3. plank flooring 4. not adopted by OSHPD	2304.7.1 2308.8.6	No effect
A.10 Particleboard Underlayment general req: 1/4" thick, Type PBU	2304.7.1 2308.8.6	No effect
A11 Wall Framing. 1. size, height, spacing 1.1 size (OSHPD amend) 1.2 height (OSHPD amend) 1.3 spacing (OSHPD amend - 16"oc) 2. framing details - OSHPD amend re: opening and bolts at concrete 3. bracing (OSHPD amends - lateral system must be designed) 4. not adopted by OSHPD 5. cripple walls 6. headers 7. pipes in walls 8. not adopted by OSHPD	2308.9 Wall framing. 1. size, height and spacing. 2. framing details 3. bracing 4. cripple walls 5. openings in exterior walls 6. openings in interior bearing walls 7. openings in interior non-bearing walls 8. pipes in walls 9. bridging 10. cutting and notching 11. bored holes	Similar Continue OSHPD amendments

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9. cutting and notching (OSHDP amends to require detailing) 10. bored holes (OSHDP amends – max. 1/3 stud width)		
A12 Roof and Ceiling Framing. 1. general (per general provisions) 2. - 6. not adopted by OSHPD 7. purlins (OSHDP amends) 8. blocking (OSHDP amends to ref. bridging req. per 2316A.2 item 22) 9. roof sheathing - ref. to Tables; ext. glue 10. roof planking	2308.10 Roof and ceiling framing 1. wind uplift 2. ceiling joist spans 3. rafter spans 4. ceiling joist and rafter framing (connections, ties, notches, holes, openings) 5. purlins 6. blocking 7. wood trusses 8. roof sheathing 9. roof planking 10. attic ventilation-refer to 1202.2	Similar Continue OSHDP amendments, do not adopt items 1-3
-	2308.11 Additional requirements for conventional construction in SDC B or C. 2308.12 Additional requirements for conventional construction in SDC D or E.	Evaluate IBC provisions for adoption (in part).
A13. Exit Facilities. Zone 3 and 4 positive anchorage to structure, no TN or withdrawal	2308.12.7 Exit facilities	Similar
Tables 23A-IV-A, 23A-IV-B Not adopted by OSHPD	Tables 2308.10.9, 2308.9.1 Allowable Spans for 2" T & G Size, Height and Spacing - Studs	Do not adopt
Table 23A-IV-C-1 Braced Wall Panels	Table 2308.9.3(1) Braced Wall Panels	Similar
Table 23A-IV-C-2 Cripple Wall Bracing	-	No effect
Table 23A-IV-D1 Wood Structural Panel Wall Sheathing	Table 2308.9.3(3) Wood Structural Panel Wall Sheathing	Similar
Table 23A-IV-D-2 Not adopted by OSHPD	Table 2308.9.3(5) Allowable Spans for Particleboard Wall Sheathing	Do not adopt
Tables 23A-IV-J-1 through Table 23A-IV-V-2 Not adopted by OSHPD	Tables 2308.8(1), 2308.8(2), ...	Do not adopt
Division V - Design Standard for Metal Plate Connected Wood Truss (Based on ANSI/TPI 1-1995) 2321A - Metal Plate Connected	2303.4 Trusses. References TPI-1 (2002 ed. Per Chapter 35) 2306.1 Allowable Stress Design References TPI-1 for allowable	Review TPI-1 -2002 to determine if any amendments may be needed.

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Wood Truss Design A.1 ref. to ANSI/TPI standard A.2 performance (load test) A.3 not adopted by OSHPD A.4 markings on truss	stress design	
Division VI - Design Standard for Structural Glued Built-Up Members - Plywood Components (Based on Design and Fabrication Specifications of the APA) 2322A through 2327A (no OSHPD amendments; rarely, if ever, used for school projects)	2306.1 references APA Plywood Design Specification and Supplements 1 – 5.	Similar - no amendment needed (the referenced standards would be very infrequently used).
Division VII Not adopted by OSHPD Sections 2328A through 2333A Tables 23A-VII-J-1 through 23A-VII-R-12	2308.10.2 Ceiling joist spans – Table 2308.10.2(1) and (2) 2308.10.3 Rafter spans – Tables 2308.10.3(1) through (6)	Do not adopt
Division VIII Not adopted by OSHPD Sections 2334A through 2336A Tables 23A-VIII-A through 23A-VIII-D	2308.10.9 Roof Planking.	IBC does not cover scope of CBC provisions (floor decking, beams); no effect for OSHPD Do not adopt
Division IX - Testing and Inspections (OSHPD amendment) 2337A A.1 Glue-laminated Timber - cont. inspection, ID marking on member A.2 Timber Connectors - cont. inspection, approved inspector A.3 Manufactured Trusses - cont. inspection, approved inspector	-	Evaluate amendments for continuous inspection of glulams, this amendment has been petitioned by APA for repeal or change. The OSHPD-AB has also requested review of this amendment to exempt a (simple) defined class of glulams from continuous inspection. The moisture content amendment must also be reviewed as part of this evaluation. OSHPD should also contact Ken Availia with Forest Product Labs.

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2001 CBC – Chapter 23	NFPA 5000 – Chapter 45	Comments
Division I - General Design Requirements 2301A – General A.1 Scope A.2 Design methods: A2.1 Allowable Stress Design. - refers to 1612A.3 and 2305A. A2.2 Conventional light-frame construction. - refers to 2305A provisions. note- 2305A is a reference to the Divisions (& Parts) for various design and construction provisions	45.1 Scope 45.4.1 ASD – refers to AF&PA ASD, <i>Allowable Stress Design (ASD) Manual for Engineered Wood Construction, 2001 ed.</i> 45.4.1.3 References AF&PA <i>Wood Frame Construction Manual (WFCM) for One and Two Family Dwellings, 2001 ed. (ANSI)</i> 45.4.2 LRFD – refers to AF&PA LRFD, <i>Load and Resistance Design Manual for Engineered Wood Construction, 1996 ed.</i>	Scope statement is similar.
2202A - Definitions	45.2 Special Definitions Glossary (ASD Manual for Engineered Wood Construction) 2.2 Terminology (2001 edition Supplement – <i>Wood Structural Panel Shear Wall and Diaphragm</i>) 2.2 Terminology (2001 edition Supplement (to ASD Manual) - <i>Special Design Provisions for Wind and Seismic</i>) 1.3 Definitions (WFCM)	Similar NFPA5000 definitions are contained in NFPA5000 and in three (3) AF&PA reference documents Review NFPA5000 and AF&PA reference documents for conflicts and completeness
2203A - Standards of Quality 1. Grading rules 2. Glue-laminated timber 3. Preservative treatment 4. Product standards 5. Design standards 6. Fire retardancy 7. Adhesives and glues 8. Design values	45.5 Criteria 1. General 2. Lumber identification 3. Determination of sizes 4. End-jointed lumber 5. Prefabricated wood I-joists 6. Glue-laminated lumber 7. Wood structural panels 8. Fiberboard 9. Hardboard products 10. Particleboard 11. Preservative-treated wood 12. Structural composite lumber 13. Hardwood plywood 14. Interior paneling 15. Fire-retardant treated wood 16. Trusses 17. Connectors, nails and staples	Similar 45.5 provisions generally address CBC 2302A and 2304A provisions.
2304A - Minimum Quality	45.5 Criteria (see above)	Similar
A.1 Quality and identification	45.5.1 General	Similar
A.2 Minimum capacity or grade (OSHDP amends - no end-jointed lumber unless approved)	NDS 2.2.1 General Requirement 45.5.4 End-jointed lumber	Similar (note that provision is in ref. std.) Continue OSHDP amendment re: end-jointed lumber
A.3 Timber connectors	45.5.17 Connectors, nails and staples- general reference to standards	Similar

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2001 CBC – Chapter 23	NFPA 5000 – Chapter 45	Comments
	45.6.8.6 – corrosion-resistant fasteners in PT and FR lumber	
<p>A.4 Fabrication, installation, manufacture</p> <p>4.1 General</p> <p>4.2 Connectors - refers to Div. III</p> <p>4.3 Glue-lams -supervision of fabrication</p> <p>4.4 Metal-plate trusses - refers to Div. V, approved agency insp.</p> <p>4.5 Fire-retardant treated wood at max. 19% m.c., ply at 15%.</p> <p>4.6 Size of members - net size</p> <p>4.7 Shrinkage consideration</p> <p>4.8 OSHPD amendment re: rejection and application of UBC Std. 23-1.</p>	<p>45.5.1 General (and referenced standards)</p> <p>45.5.3 Determination of Sizes</p> <p>45.5.1.16 Trusses</p> <p>45.5.6 Structural Glue-laminated Timber</p> <p>45.5.15 Fire Retardant-treated wood; 45.5.15.4 Moisture Content</p> <p>45.6.3 Size of structural members</p>	<p>Similar</p> <p>Consider amendment re: shrinkage; study (and discontinue?)</p> <p>Evaluate CBC 2304A.8 (OSHPD amendment re: rejection of lumber) for continuation – appears to be dated and imposes responsibility on the inspector that can not be fulfilled (project inspectors are not required to be qualified lumber graders).</p>
<p>2305A - Design and Construction Requirements</p> <p>A.1 General</p>	<p>45.3 General.</p> <p>45.4 Design Requirements.</p>	Similar
A.2 Requires compliance with Div. I, and Div. II, Part I.	45.6.1 General Construction Requirements	Similar
A.3 Wind/EQ systems for engineered bldg. Per Div. II, Part II	45.4.1.1 references the ASD Manual, which includes the <i>Supplement: Special Provisions for Wind and Seismic</i>	<p>Provisions are similar, except that the (NFPA) provisions are contained in an AF&PA document Supplement to the ASD Manual titled <i>Supplement: Special Design Provisions for Wind and Seismic</i>.</p> <p>There does not appear to be a complete path of reference to the applicable Supplement. The identified paths of reference to the (NFPA) provisions are:</p> <ul style="list-style-type: none"> - 45.4.1.1 reference to ASD Manual. - Manual Sec. 9.2 reference to AF&PA <i>Wood Structural Panel Shear Wall and Diaphragm Supplement</i> (includes some duplicative information with the <i>Supplement: Special Provisions for Wind and Seismic</i>). - No reference found from the <i>Wood Structural Panel Shear Wall and Diaphragm Supplement</i> to the <i>Supplement: Special Provisions for Wind and Seismic</i>. - ASD Manual Sec. 1.4 has general reference to the <i>Supplement: Special Design Provisions for Wind and Seismic</i> <p>Evaluate and amend to provide clear reference to supplement provisions, also need to review supplements for duplication, conflict and to establish precedence. (example – the shear wall tables in each supplement are not the same; one provides shear values for wood panels over gypsum sheathing while the other does not)</p>
A.4 ASD design/const. Per Div. III	45.4.1 Allowable Stress Design	<p>NFPA adopts the AF&PA Manual (not the NDS) for ASD. The ASD Manual is a design guideline and a multi-part package (as stated by NF&PA), and includes the following separate documents:</p> <ul style="list-style-type: none"> - 2001 NDS and Supplement (design values) - Supplements (lumber, glue-lam, poles, panels,

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		<p>diaphragms & shear walls)</p> <ul style="list-style-type: none"> - Supplement: Special Design Provisions for Wind and Seismic - Guidelines (I-joists, composites, trusses, metal connectors) <p>Use of the AF&PA Manual (includes 6 documents) as an enforcement tool presents complexities compared to 2001 CBC, which uses only the NDS and it's Supplement (2 documents), in conjunction with the CBC.</p>
A.5 Design/const. of conventional light-frame const. per Div. IV.	45.4.1.3	<p>NFPA does not contain provisions for conventional construction, and references the WFCM for 1 & 2 family dwelling design and construction (WFCM does contain prescriptive provisions in both Part 2 and Part 3, with duplication).</p> <p>The CBC provisions for conventional construction are applicable to wood-frame structures regardless of occupancy, while it appears that NFPA's reference documents only provide conventional provisions for 1 & 2 family dwellings.</p> <p>OSHDP will not adopt 45.4.1.3 (reference to WFCM), as that occupancy is not applicable to OSHDP. OSHDP will need to promulgate conventional provisions to continue the current CBC provisions for application to wood frame schools.</p>
A.6 Connectors per Div. III, Part III	45.6.8 Connectors and Fasteners.	Similar (NFPA adopts NDS provisions)
A.7 Metal plate trusses per Div. V	45.5.16 Trusses	Similar
A.8 Glued built-up members with plywood per Div. VI	-	APA design standards (structural glued built-up members - plywood components) could be adopted by OSHDP; do not appear to be referenced in AF&PA documents or NFPA5000. (note- these provisions are seldom, if ever, used).
A.9 Not adopted by OSHDP	-	No effect
A.10 Not adopted by OSHDP	-	No effect
A.11 OSHDP amendment – testing & inspection per Div. IX	-	Continue amendments (evaluate continuation of continuous inspection requirements for glue-laminated beams, APA has currently petitioned OSHDP to repeal or modify the current amendment)
Division II - General Requirements Part I - Requirements Applicable to All Design Methods (2316-2314) 2306A - Decay and Termite Protection	45.6 General Construction Requirements. 45.6.9 Protection Against Decay and Termites.	Similar; see comments below for any specific differences
A.1 Preparation of Bldg Site Reference to Sec. 3302	36.2.5	Similar
A.2 Wood Support Embedded in Ground PT requirement- ground contact	45.6.9.6.10 45.6.9.6.11	NFPA less restrictive, allows “naturally durable wood” in contact with ground to support buildings (6.10) OSHDP may amend to continue CBC provision

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A.3 Under-floor Clearance 18"/12" clearance and access	45.6.9.6.3	Similar
A.4 Plates, Sills and Sleepers treated with approved agency stamp (OSHDP amendment - 12" above grade or 6" w/ mow strip; curb at toilet room)	45.6.9.6.5	CBC requires sills that rest on masonry or concrete foundation are to be PT or foundation redwood. Evaluate NFPA provision for amendment to continue CBC requirements, and also continue the OSHDP amendments currently in CBC.
A.5 Columns and Posts 8" above exposed ground; OSHDP amends - exposed columns	45.6.9.6.8	Similar Continue OSHDP amendments
A.6 Girders Entering Masonry or Concrete Walls 1/2" clearance at end/side of girder OSHDP amends to include joists & beams, field treatment	45.6.9.6.6	Similar Continue OSHDP amendments
A.7 Under-floor Ventilation 1/150 floor area cross venting, screening	-	Develop amendment to continue current CBC requirements (which are model code provisions)
A.8 Wood and Earth Separation 6" clearance unless PT, planters to have 2" air space	45.6.9.6.7	Similar
A.9 Wood Supporting Roofs and Floors Decay resistant or PT if exposed	45.6.9.6.12	Similar
A.10 Moisture Content of Treated Wood Max. 19% m.c. prior to closing in	45.5.11.6	Similar
A.11 - not adopted by OSHDP	-	No effect
A.12 Weather Exposure Exposed glue-laminated timber to be PT or decay resistant; plywood also (OSHDP amends)	45.6.9.6.9	Similar
A.13 Water Splash WP paper protection if exposed to water splash (tile, plaster)	-	Develop OSHDP amendment to continue CBC (model code) provision
2307A - Wood Supporting Masonry or Concrete Prohibits use of wood to support masonry/concrete DL, with 4 exceptions noted	45.6.10 Wood Supporting Masonry or Concrete	Similar
2308A - Wall Framing Wall framing per Div. IV unless specific design provided/approved Shrinkage analysis if > 2 stories + roof	-	Develop OSHDP amendment to continue (model code) provisions.
2309A - Floor Framing Reference to Ch. 16A for wall-floor	-	No effect

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anchorage Reference to Sec. 708 fire blocking and draft stopping		
2310A - Exterior Wall Covering	-	General comment – NFPA5000 does not appear to contain the prescriptive provisions that the CBC contains for wood wall coverings.
A.1 General Weather-resistive barrier	37.3.1 (contained in Chapter 37 – Exterior Wall Construction)	Similar
A.2 Siding Siding materials, fastening	45.6.6.1	NFPA provision refers to NF&PA reference documents
A.3 Plywood Exterior application and joint treatment requirements	45.6.6.2	NFPA provisions are not prescriptive regarding application (e.g. joint treatment)
A.4 Shingles or Shakes Bldg. Paper, fasteners, weather exposure per Table 23A-II-K	-	No provisions
A.5 Particleboard Exterior application and fastening, joint treatment	45.5.10 Particleboard	NFPA does not contain specific provisions for exterior application, references ANSI standards
A.6 Hardboard Exterior application and fastening, joint treatment	45.5.9 Hardboard Products	NFPA references ANSI standards, refers to “manufacturer’s recommendations” to installation No prescriptive provisions as contained in CBC
A.7 Nailing (corrosion resistant)	-	Develop OSHPD amendment to continue CBC (model code) provision
2311A - Interior Paneling softwood structural panels - ref. to Table 23A-II-B-1, UBC Std. 23-3, Chapter 8 (int. finish)	45.5.14 Interior Paneling	Similar
2312A - Sheathing A.1 Structural floor sheathing - reference to span table A.2 Structural roof sheathing – reference to span table	45.6.7 Floor and Roof Sheathing	NFPA provisions refer to AF&PA documents No material differences regarding requirements AF&PA ASD Manual Supplement – Wood Structural Panels does not provide one table (similar to CBC Table 23A-II-E-1) to prescribe requirements (e.g. loads, spans, edge support) requirements for floor and roof sheathing
2313A - Mechanically Laminated Floors and Decks prescriptive requirements for lumber set on edge	45.6.5.3	NFPA references AF&PA Wood Construction Data No. 4, <i>Plank and Beam Framing for Residential Buildings</i> . No material effect, as 2313A provisions generally not used for school construction.
2314A - Post-Beam Connections	45.6.4.6	Similar
Part II - Requirements Applicable to Engineered Design of Wind and EQ Load-Resisting Systems 2315A - Wood Shear Walls and Diaphragms	45.4.1.1 references the ASD Manual, which includes the <i>Supplement: Special Provisions for Wind and Seismic</i>	Provisions are similar, except that the (NFPA) provisions are contained in an AF&PA supplement to the ASD Manual titled <i>Supplement: Special Design Provisions for Wind and Seismic</i> . There does not appear to be a complete path of reference to the applicable Supplement. The identified paths of reference to the (NFPA) provisions are: - 45.4.1.1 reference to ASD Manual.

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		<p>- Manual Sec. 9.2 reference to AF&PA <i>Wood Structural Panel Shear Wall and Diaphragm Supplement</i> (includes some duplicative information with the <i>Supplement: Special Provisions for Wind and Seismic</i>.</p> <p>- No reference found from the <i>Wood Structural Panel Shear Wall and Diaphragm Supplement</i> to the <i>Supplement: Special Provisions for Wind and Seismic</i>.</p> <p>- ASD Manual Sec. 1.4 has a general reference to the <i>Supplement: Special Design Provisions for Wind and Seismic</i>; no other reference could be identified.</p> <p>Evaluate and develop amendments within NFPA5000 to provide clear reference to Supplement provisions, also need to review the primary Supplement document for duplication, conflict and to establish precedence.</p> <p>Example: shear wall tables in each supplement are not the same. One provides shear values for wood panels over gypsum sheathing while the other does not. May need to amend either Supplement.</p>
<p>A.1 General</p> <p>Deflection consideration, ref. to UBC Std. 23-2 for deflection calc.</p> <p>Aspect ratio ref. to Table 16A-V</p> <p>OSHDP amendment re: test confirmation for analysis method</p> <p>Open-front bldg. limitations</p>	<p>Following provisions are contained in the AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i>:</p> <p>4.2.1 Application Requirements</p> <p>4.2.2 Deflection (horizontal diaphragms)</p> <p>4.2.4 Diaphragm Aspect Ratios</p> <p>4.2.5 Horizontal Distribution of Shear</p> <p>4.3.2 Deflection (shear walls)</p> <p>4.3.4 Shear Wall Aspect Ratios</p> <p>4.3.5 Shear Walls with Openings</p> <p>Following provisions are contained in the AF&PA <i>ASD Wood Structural Panel Shear Wall and Diaphragm Supplement</i>:</p> <p>3.3 Diaphragm Deflection</p> <p>4.3 Shear Wall Deflection</p>	<p>Similar scope of design addressed</p> <p>The two supplements have provisions (both text and tables) that overlap.</p> <p>Deflection analysis formulae are different (but should yield the same result)</p> <p>Careful review for overlap and potential conflict is required. OSHPD would probably not adopt any overlapping provisions contained in the <i>ASD Wood Structural Panel Shear Wall and Diaphragm Supplement</i>.</p> <p>Continue OSHPD amendments (amendments to the Supplement would be contained in NFPA5000, which is difficult for users)</p>
<p>A.2 Wood Members Resisting Horizontal Forces Contributed by Masonry and Concrete</p> <p>OSHDP amendment - wood not allowed to resist continuously applied horizontal force</p>	<p>Following provisions are contained in the AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i>:</p> <p>4.1.5 Wood Systems Resisting Horizontal Seismic Forces Contributed by Masonry and Concrete</p>	<p>Similar, continue OSHPD amendments</p>
<p>A.3 Wood Diaphragms</p> <ol style="list-style-type: none"> conventional lumber diaph. special lumber diaph. plywood diaph. (OSHDP amend) 	<p>Following provisions are contained in the AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i>:</p> <p>4.2.7 Diaphragm Assemblies</p>	<p>Similar</p> <p>Review for amendment, do not adopt 4.2.7.4</p> <p>Continue OSHPD amendments</p> <p>Note- amendments will be contained in NFPA5000, but applicable to referenced standards</p>

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	4.2.7.1 Wood structural panel diaphragms 4.2.7.2 Diaphragms diagonally sheathed with single-layer of lumber 4.2.7.3 Diaphragms diagonally sheathed with double-layer of lumber 4.2.7.4 Diaphragms horizontally sheathed with single-layer of lumber	applicable to referenced standards
A.4 Particleboard Diaphragms. OSHPD amends - specific approval required for use	-	No effect
A.5 Wood Shear Walls and Diaphragms in Seismic Zones 3/4 1. scope 2. framing - OSHPD amends re: chord/collector location within 14" 3. wood structural panels - 24" min. width, blocking 4. heavy wood panels - 2x diag. Sheathing; panels overlaying straight sheathed deck 5. not adopted by OSHPD	Following provisions are contained in the AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i> : 4.1.6 Toenails (pertains to SDC D, E, F)	Continue OSHPD amendments; need to determine most appropriate NFPA5000 or reference document sections to locate amendments
A.6 Not adopted by OSHPD	-	No effect
Table 23A-II-A-1 Exposed Plywood Panel Siding	-	Evaluate need for amendment
Table 23A-II-A-2 Allowable Spans for Exposed Particleboard Panel Siding	-	Evaluate need for amendment
Table 23A-II-B-1 Nailing Schedule (OSHPD amends)	Table 45.6.8.2 General Fastening Schedule	Study Continuation of OSHPD amendments
Table 23A-II-B-2 Wood Structural Panel Roof Sheathing Nailing Schedule (wind)	-	No effect to OSHPD programs
Table 23A-II-C Hardboard Siding	No table identified - see 45.5.9 Hardboard Products	Evaluate references (ANSI/AHA A135.4)
Table 23A-II-D-1 Allowable Spans for Lumber Floor and Roof Sheathing	See AF&PA Supplement – Wood Structural Panels See Tables 5.2, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5	Evaluate AF&PA Supplement provisions, determine if usable as presented, or if a OSHPD amendment Table needed to replicate the CBC Table provisions
Table 23A-II-D-2 Sheathing Lumber Minimum Grade Requirements: Board Grade	-	No effect to OSHPD program

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Table 23A-II-E-1 Allowable Spans and Loads for Wood Structural Panel Sheathing (perpendicular to supports)	See AF&PA Supplement – Wood Structural Panels See Tables 5.2, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5	Evaluate AF&PA Supplement provisions, determine if usable as presented, or if a OSHPD amendment Table needed to replicate the CBC Table provisions
Table 23A-II-E-2 Allowable Load for Wood Structural Panel Roof Sheathing (parallel to supports)	See AF&PA Supplement – Wood Structural Panels See Tables 5.2, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5	Evaluate AF&PA Supplement provisions, determine if usable as presented, or if a OSHPD amendment Table needed to replicate the CBC Table provisions
Table 23A-II-F-1 Allowable Span for Wood Structural Panel Combination Subfloor-Underlayment	See AF&PA Supplement – Wood Structural Panels See Tables 5.2, 6.2, 7.1, 7.2, 7.3, 7.4, 7.5	Evaluate AF&PA Supplement provisions, determine if usable as presented, or if a OSHPD amendment Table needed to replicate the CBC Table provisions
Table 23A-II-F-2 Not adopted by OSHPD	-	No effect
Table 23A-II-G Not adopted by OSHPD	-	No effect
Table 23A-II-H Allowable Shear for Horizontal Diaphragms (OSHPD amends)	AF&PA Supplement – <i>Wood Structural Panel Shear Wall and Diaphragm</i> - Table 3.1A (wind) Table 3.1B (seismic) AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i> – Table 4.2A (blocked), Table 4.2B (unblocked), Table 4.2C (lumber diaphragms)	Evaluate duplicative provisions; must repeal overlapping provisions and amend the adopted tables to continue OSHPD provisions
Table 23A-II-I-1 Allowable Shear for Plywood Shear Walls (OSHPD amends)	AF&PA Supplement – <i>Wood Structural Panel Shear Wall and Diaphragm</i> - Table 4.1A (wind) Table 4.1B (seismic) AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i> – Table 4.3A (wood-based sheathing), Table 4.3B (gypsum and plaster), Table 4.3C (lumber diaphragms)	Evaluate duplicative provisions; must repeal overlapping provisions and amend the adopted tables to continue OSHPD provisions
Table 23A-II-I-2 Not adopted by OSHPD	-	No effect
Table 23A-II-J Not adopted by OSHPD	-	No effect
Table 23A-II-K Wood Shingle and Shake Side Wall Exposures	-	No effect
Figure 23A-II-1 General Definition of Shear Wall Height to Width Ratio	-	Se AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i> – 4.3.5 Shear Walls with Openings no illustration, no effect to OSHPD program
Division III - Design Specification for Allowable Stress Design of Wood Buildings	45.4.1 ASD – refers to AF&PA ASD, <i>Allowable Stress Design (ASD) Manual for Engineered Wood Construction, 2001 ed.</i>	NFPA5000 adopts the AF&PA Manual (not the NDS) for ASD. The ASD Manual is a multi-part package (as stated by NF&PA), and includes the following separate documents:

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Part I - Allowable Stress Design of Wood References ANSI/NfoPA NDS-91 Revised 1991 Edition, and Supplement to the 1991 Edition		<ul style="list-style-type: none"> - 2001 NDS and Supplement (design values) - Supplements (lumber, glue-lam, poles, panels, diaphragms & shear walls) - Supplement: Special Design Provisions for Wind and Seismic - Guidelines (I-joists, composites, trusses, metal connectors) <p>Use of the AF&PA Manual (includes 6 documents) as an enforcement tool presents complexities compared to 2001 CBC, which uses only the NDS and it's Supplement (2 documents), in conjunction with the CBC. The manual contains fire-safety design provisions that will require a coordinated review with the SFM for adoption.</p> <p>The AF&PA ASD Manual, Supplements, and Guidelines comprise a design guide for design professionals (as stated in the Preface of the Manual) and is not formatted and written as an enforceable standard. The supplement <i>Special Design Provisions for Wind and Seismic</i> is written in enforceable standard format and contains provisions that must be incorporated in the 2004 CBC.</p> <p>OSHDP will need to amend 45.4.1 to reference the NDS and NDS Supplement (which are enforceable standards), and will need to incorporate certain provisions contained in the AF&PA manual and supplement(s) into the NFPA5000 code.</p>
2316A - Design Specifications A.1 Adoption and Scope Adopts NDS Rev. 1991 Ed., including Appendix F, G, J. Adopts Supplement - Tables 2A, 4A, 4B, 4C, 4D, 4E, 5A, 5B, 5C. OSHDP amends to delete C_r factor (rep stress inc.) from Tables	See above	See above
A.2 Amendments to NDS (model code amends per items 1 - 26; OSHDP further amends per items 1-35)	-	NFPA does not amend the NDS; OSHDP will need to evaluate continuation of CBC amendments (both model code and OSHDP amendments). 2001 NDS continues many 1991 provisions that were amended in the 2001 CBC.
OSHDP amendments item No: 3. rep. stress inc. limitation 6. 25% DOL okay if 1 reroof inc. 8. 90% for fasteners if fire retard. 12. notches in sawn lumber 13. notches in glue-laminated 21. provisions for lateral support 22. bridging for roof/floor joists 23. radial tension reinforcement 25. radial tension design 28. glue lam manufacture, m.c. 29. glue lam specs, PT protection 30. bolt at wood to concrete 31. delete 12.2.3 - NDS provision 32. delete 12.3.7 - NDS provision		CBC amendments appear useful for enforcement agency use, need to evaluation for continuation: <ul style="list-style-type: none"> - reduces duplicity - repeals NDS references to non-codified references for design - deletes Appendix B Table for DOL (use tabulated values only, which are amended) - coordinates DOL with Chapter 16 load comb. requirements - glulam beam radial tension design requirements amended - fastener (nail) spacing prescriptive requirements - bolt at concrete allowed to be .5 dbl. shear value for

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		wood member 2x thickness
2303A. item 5.4 (OSHPD does not adopt)	45.4.2 Load and Resistance Factor Design References AF&PA LRFD, <i>Load and Resistance Factor Design Manual for Engineered Wood Construction</i> (1996 ed.)	Evaluate the necessity for OSHPD to review AF&PA LRFD Design Manual and ASCE 16 for adoption. Check with industry, ICC, SEAOC ?? Check whether LRFD provisions address ASD provisions contained in 2306 re: construction requirements
Part II - Plywood Structural Panels 2317A - Plywood Structural Panels references Table 23A-III-A	AF&PA Supplement – Wood Structural Panels Tables 3.1, 3.1.1, 3.2, 3.2.1, 3.3, 3.3.1, 3.4, 3.4.1, Table 5.2 (Panel Section Properties)	Similar, direct reference to NFPA5000 preferable
Part III - Fastenings 2318A - Timber Connectors and Fasteners A.1 General. References Div. III Part I (NDS), or 2318A.	45.4.1.1 reference to AF&PA ASD Design Manual	NFPA5000 adopts the AF&PA Manual (not the NDS) for ASD. The ASD Manual is a multi-part package (as stated by NF&PA), and includes the following separate documents: <ul style="list-style-type: none"> - 2001 NDS and Supplement (design values) - Supplements (lumber, glue-lam, poles, panels, diaphragms & shear walls) - Supplement: Special Design Provisions for Wind and Seismic - Guidelines (I-joists, composites, trusses, metal connectors) Recommend direct adoption in NFPA5000 of NDS and NDS Supplement All NFPA connection provisions are contained only within the NDS, 2001 ed. There are fastener tables for various configurations (i.e. sideplates, member type/thickness) Also note new provision in NDS for rivets (Section 13). Current OSHPD amendments would need to be continued as amendments to the referenced standard. Staff training for use of NDS will be required.
A.2 Bolts Ref. Tables 23A-III-B-1, B-2. OSHPD amendment re: carriage bolts and cross grain shrinkage	NDS Sections 10, 11	Evaluate OSHPD amendments for continuation (would amend the NDS)
A.3 Nails and Spikes 1. allowable loads - ref. Tables 23A-III-C-1 and C2. OSHPD amendment - casing nails/toenails Zone 3/4 limitation - toenail 150 plf 2. Withdrawal values per Table 23A-III-D (OSHPD amends - limits to connection with 4 nails max) 3. spacing and penetration (OSHPD amends - 2 - 2x members nailed and overdriven plywd. Nails) 4. OSHPD amendment - corrosion resistance for exterior siding nails	NDS Sections 10, 11	Evaluate OSHPD amendments for continuation (amend the NDS) Revise exterior siding nail amendment from 1.5 oz to 1.0 oz coating, may place amendment in 45.5.17

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A.4 structural hardware - general	45.5.17.1 – references ASTM D 1761	Review ASTM D 1761
A.5 Misc. Fasteners 1. drift bolts/pins 2. spike grids	NDS provisions do not specifically address	No effect, since CBC provisions are general
A.6 (OSHDP amendment) Wood screws and lag screws 1. limitations on withdrawal; washer under head of lag screw	-	Evaluate amendments for continuation (would amend NDS, Section 11)
A.7 (OSHDP amendment) Metal plate connectors for trusses 1. joint design 2. basic load values 3. inspection 4. truss loads 5. truss drawings 6. moisture content	45.5.16 Trusses refers to ANSI/TPI 1, 1995 ed.	Evaluate amendments for continuation in TPI 1
Part IV - Allowable Stress Design for Wind and EQ Loads 2319A - Wood Shear Walls and Diaphragms A.1 conventional lumber diaphragms (OSHDP amends to address allowable loads and 2x6 diagonal sheathing w/ 16d nails) A.2 special lumber diaphragms - ref. 2315A.3.2 A.3 plywood diaphragms - ref. to Tables and 2315A.3.3; addresses plywood on both sides of wall	AF&PA Supplement – <i>Special Design Provisions for Wind and Seismic</i>	Need direct reference from NFPA5000 to this document
A.4 & A.5 - Not adopted by OSHDP	-	
Table 23A-III-A Allowable Unit Stresses for Construction and Industrial Softwood Plywood	AF&PA Supplement – Wood Structural Panels Tables 3.1, 3.1.1, 3.2, 3.2.1, 3.3, 3.3.1, 3.4, 3.4.1, Table 5.2 (Panel Section Properties)	More complicated than CBC provisions Direct reference from NFPA5000 desirable
Table 23A-III-B-1 Bolt Design Values for Single Shear Connections	NDS Table 11A, 11B, 11C, 11D, 11E Bolts: Design Values for Single Shear Connections	Similar, need direct reference from NFPA5000
Table 23A-III-B-2 Bolt Design Values for Double Shear Connections	NDS Table 11F, 11G, 11H, 11I Bolts: Design Values for Double Shear Connections	Similar, need direct reference from NFPA5000
Table 23A-III-C-1 Box Nail Design Values for Single Shear Connections	NDS Table 11N, 11P, 11Q, 11R Common Wire, Box, Sinker Nails: Design Values for Single Shear	Similar, need direct reference from NFPA5000

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Table 23A-III-C-2 Common Wire Nail Design Values for Single Shear Connections	NDS Table 11N, 11P, 11Q, 11R Common Wire, Box, Sinker Nails: Design Values for Single Shear	Similar, need direct reference from NFPA5000
Table 23A-III-D Nail and Spike Withdrawal Design Values	NDS Table 11.2c Nail and Spike Withdrawal Design Values	Similar, need direct reference from NFPA5000
Division IV - Conventional Light-Frame Construction 2320A - Conventional Light-Frame Construction Design Provisions A.1 General. (OSHDP amends to state "in addition to other reqmts")	-	NFPA5000 does not contain provisions for conventional construction, and references the WFCM for 1 & 2 family dwelling design and construction (WFCM does contain prescriptive provisions in both Part 2 and Part 3, with duplication). The WFCM is based on ASCE 7-98 (NFPA5000 references ASCE 7-02). The CBC provisions for conventional construction are applicable to wood-frame structures regardless of occupancy, while it appears that NFPA's reference documents provides conventional provisions for 1 & 2 family dwellings only. OSHDP will not adopt 45.4.1.3 (reference to WFCM), as that occupancy is not applicable to OSHDP's programs. OSHDP will need to promulgate conventional provisions to continue the current CBC provisions for application to wood frame schools.
A.2 - A.5.5 not adopted by OSHDP	-	Develop amendments to NFPA5000
A5.6 Interior Brace Wall Support. Foundation requirements	-	Develop amendments to NFPA5000
A.6 Foundation Plates or Sills. OSHDP amends - sill bolts size/spacing/end distance; AB embed at curd; AB at sill plate notches; field treatment	-	Develop amendments to NFPA5000
A.7 Girders.	-	Develop amendments to NFPA5000
A.8 Floor Joists. 1. general (OSHDP amend – design per general provisions, calcs) 2. bearing 3. framing details; notches (OSHDP amend re: ledger strip 2x min) 4. framing around openings 5. supporting bearing walls (OSHDP amend re: built-up beams or blkg) 6. blocking 7. bridging (OSHDP amend)	-	Develop amendments to NFPA5000
A.9 Subflooring. 1. not adopted by OSHDP 2. plywood - ref. tables	-	Develop amendments to NFPA5000

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3. plank flooring 4. not adopted by OSHPD		
A.10 Particleboard Underlayment general req: 1/4" thick, Type PBU	-	Develop amendments to NFPA5000
A11 Wall Framing. 1. size, height, spacing 1.1 size (OSHPD amend) 1.2 height (OSHPD amend) 1.3 spacing (OSHPD amend – 16"oc) 2. framing details – OSHPD amend re: opening and bolts at concrete or masonry wall) 3. bracing (OSHPD amends – lateral system must be designed) 4. not adopted by OSHPD 5. cripple walls 6. headers 7. pipes in walls 8. not adopted by OSHPD 9. cutting and notching (OSHPD amends to require detailing) 10. bored holes (OSHPD amends – max. 1/3 stud width)	-	Develop amendments to NFPA5000
A12 Roof and Ceiling Framing. 1. general (per general provisions) 2. - 6. not adopted by OSHPD 7. purlins (OSHPD amends) 8. blocking (OSHPD amends to ref. bridging req. per 2316A.2 item 22) 9. roof sheathing - ref. to Tables; ext. glue 10. roof planking	-	Develop amendments to NFPA5000
A13. Exit Facilities. Zone 3 and 4 positive anchorage to structure, no TN or withdrawal	-	Evaluate to determine if amendment needed to continue provision in 2004 CBC
Tables 23A-IV-A, 23A-IV- B Not adopted by OSHPD	-	
Table 23A-IV-C-1 Braced Wall Panels	-	Evaluate to determine if amendment needed
Table 23A-IV-C-2 Cripple Wall Bracing	-	Evaluate to determine if amendment needed
Table 23A-IV-D1 Wood Structural Panel Wall Sheathing	-	Evaluate to determine if amendment needed

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Table 23A-IV-D-2 Not adopted by OSHPD	-	
Tables 23A-IV-J-1 through Table 23A-IV-V-2 Not adopted by OSHPD	-	
Division V - Design Standard for Metal Plate Connected Wood Truss (Based on ANSI/TPI 1-1995) 2321A - Metal Plate Connected Wood Truss Design A.1 ref. to ANSI/TPI standard A.2 performance (load test) A.3 not adopted by OSHPD A.4 markings on truss	45.5.16 Trusses refers to ANSI/TPI 1, 1995 ed.	Evaluate amendments for continuation in TPI 1
Division VI – Design Standard for Structural Glued Built-Up Members – Plywood Components (Based on Design and Fabrication Specifications of the APA) 2322A through 2327A (no OSHPD amendments; rarely, if ever, used for school projects)	-	Determine if amendment needed to adopt APA Plywood Design Specification and Supplements 1-5
Division VII Not adopted by OSHPD Sections 2328A through 2333A Tables 23A-VII-J-1 through 23A-VII-R-12	-	
Division VIII Not adopted by OSHPD Sections 2334A through 2336A Tables 23A-VIII-A through 23A-VIII-D	-	
Division IX - Testing and Inspections (OSHPD amendment) 2337A A.1 Glue-laminated Timber - cont. inspection, ID marking on member A.2 Timber Connectors - cont. inspection, approved inspector A.3 Manufactured Trusses - cont. inspection, approved inspector	-	Evaluate amendments for continuous inspection of glulams, this amendment has been petitioned by APA for repeal or change. The OSHPD-AB has also requested review of this amendment to exempt a (simple) defined class of glulams from continuous inspection. The moisture content amendment must also be reviewed as part of this evaluation. OSHPD should also contact Ken Avialia with Forest Product Labs.